

**Q&A Panel**

COL NEGRON: Before we start the Q&A, let me just remind everybody -- I said at the very beginning, we are going to have 100-percent autonomous vehicles. I said we are going to go through varied terrain, and, of course, the prize award will be given to the fastest vehicle. I did make the waiver that it is going to be inside the 10-hour block. So that is what we are looking at right now.

Hopefully, everybody has had an opportunity to write down their questions. If you can begin lining up behind the mics right here, I will move the chairs up front here, and we will start getting our team here to answer some of your questions.

Scott Fish, Sal Fish the route director, Mike Fagan the rules, Mike Mulqueen our technical director, Diane Sidebottom our legal advisor, and, of course, Jan Walker our PA person.

If I can get you to state your name and just read the question off, I will direct the question to the expert on the panel.

Are we going to alternate mics? Can I get the first question, please?

1 QUESTIONER: My name is Labar Askew [ph], and my  
2 [inaudible]. Are tethered sensors such as balloons or  
3 vertical lift sensor platforms considered sub-vehicles?

4 PANEL: Good question. Let's see. That is the  
5 reason I have my staff. Okay. You know, it takes a long  
6 time to write rules here. Did everybody hear the question?  
7 Is there anybody in the back who did not hear the question?  
8 Raise your hand. Okay, I will repeat the question. The  
9 question is: Is a tethered sensor considered to be part of  
10 the vehicle? I don't want to give an answer now, but I  
11 don't recall anything in the rules that you have in the book  
12 that prohibits that. It is attached to the vehicle. Right?  
13 I don't think you would make it under the underpass.

14 QUESTIONER: We will reel it in or something.

15 PANEL: That is a good question. I hope the rest  
16 of them are easier. I don't know. [Laughter.] It is  
17 attached to the vehicle. It is one system. Right? Good  
18 question. We will post the answer on the web. The first  
19 question and you get the prize. Okay? [Applause.] Come  
20 see me after. I will buy you a drink. All right. Our  
21 second question?

22 QUESTIONER: Can an individual participate on more

1 than one team? My name is Peter Marlow [ph].

2 PANEL: An individual can participate in more than  
3 one team? Yes. Next question.

4 QUESTIONER: Larry Mathees [ph]. I think many  
5 potential entrants will have equipment or facilities that  
6 were purchased or constructed under previous Government  
7 contracts, and I am not sure where the line is drawn about  
8 how much of that kind of equipment or facilities as legacy  
9 from previous Government work is usable.

10 PANEL: What we are concerned about is you using  
11 Government-furnished equipment that you have at your  
12 facility that has been given to you for other contracts. If  
13 it is equipment that you purchased for another contract, but  
14 was yours and you got to keep it at the end, then it is  
15 still yours and you can use it. Just nothing that is funded  
16 with Government money now or at the time of the event.  
17 Okay, next question in the back.

18 QUESTIONER: My name is Surion Saheeb [ph] from  
19 [inaudible] Communication in [inaudible] California. My  
20 question goes to the first question you already have related  
21 to sub-vehicles. What is considered to be a sub-vehicle?  
22 What if I have a vehicle that has a tow and is pulling

1 another vehicle? Will they be considered as one vehicle or  
2 is that going to be illegal? My second question is in the  
3 same sense, if we have an example, for instance,  
4 [inaudible], if we have individual modules which are  
5 components for the vehicle and each one of them can be  
6 individually tied to each other, what is going to be the  
7 boundaries to see -- or that DARPA will let us know about  
8 when the vehicle can be a sub-vehicle?

9           PANEL: I will take this one. Here is what I am  
10 going to do. The question is about tethering and  
11 [inaudible] committee. We will adjust that by 1 April and  
12 post it. We have got to go back and discuss that among the  
13 team and get our experts to really look at the depth of that  
14 question. So let me table that one, write it down, and we  
15 will answer that, hopefully, when we post it to the website.  
16 The same with the tethered question. Next.

17           QUESTIONER: My name is Mike Thomas. I am from  
18 Chennith [ph] Racing Products. I have two questions. The  
19 first one to Sal, is it possible that SCORE could provide  
20 insurance, a group deal such as we do in the races? Is that  
21 a possibility? Oh, come on, Sal.

22           PANEL: Yeah, I know. That became my question.

1 The Government is not going to arrange insurance coverage  
2 for you. We can't do that since you are not under contract  
3 with us. What we will do is we are going to try and find  
4 insurance companies that would be willing to cover an event  
5 like this. Now, if you have found other alternate insurance  
6 possibilities that don't seem interested -- maybe it is  
7 because they don't know what is going on or what the risk  
8 factors are with this particular event -- you can send them  
9 to us and we will answer all of their questions. But SCORE  
10 is not going to set up sort of a blanket insurance policy  
11 for all the participants. Is that your question?

12 QUESTIONER: Okay. The reason I asked that -- and  
13 Sal, I think understands why because as participants in  
14 off-road racing, we pay a fee that covers that insurance. I  
15 just wondered if there would be a possibility that it could  
16 be underwritten by one company, and we could all participate  
17 in that same --

18 PANEL: As of right now, that is not a possibility  
19 that we have thought about. We will look into it, and we  
20 will let you know whether it is something we can accomplish.  
21 Right now, I don't see it as being something that is likely  
22 to happen, but we can certainly look into it.

1 QUESTIONER: Okay. The second question, any  
2 technology that is disclosed, a technical paper that we  
3 [inaudible] be done?

4 PANEL: Yes. The answer to that is yes, and let  
5 me follow up on that. Remember, your technical paper will  
6 be published to the public after the event. So that is one.  
7 When you look at the technical paper, a lot of the  
8 proprietary information is not really in the paper itself.  
9 I know that is a concern, and we are looking into that, but  
10 we will work something out that will benefit us as well as  
11 you. Next question, please.

12 QUESTIONER: Mark Rosenbloom [ph] from Denver,  
13 Colorado. My first question is: What is the maximum number  
14 of questions we can ask?

15 PANEL: That counts as one. [Laughter.] I think  
16 you are done. You can meet me at the bar. No. You can ask  
17 two questions if you have to. I am willing to do that, just  
18 to speed it up.

19 QUESTIONER: Is there going to be a shakeout area  
20 or a shakeout time that we can test our vehicles that is not  
21 the racetrack?

22 PANEL: I don't think there is a problem with

1 taking your vehicle anywhere in the desert, whether it be  
2 California, Nevada, or Arizona, that allows open running  
3 prior to the event. I don't think that is our concern here  
4 at DARPA, is it? No. It is not my concern. My issue is  
5 this. Somewhere for the ribbon-cutting, on the 11th I  
6 believe, we will do that in Anaheim. We will move it to the  
7 track on the 12th. Really, you are shaking the vehicle out.  
8 For us, we are really testing the vehicle if it is capable  
9 of performing the technical requirements that you have  
10 stated in your paper. Third, to me, I look at close to the  
11 first hour of the event. Really, it is too late for you  
12 guys, but for us it is really shaking the vehicle out. So  
13 those are things we are looking at. Nothing is definite.  
14 We are still planning the route, but that is how I see us  
15 stair-stepping to a solution. We are really concerned about  
16 safety, and we are really concerned to ensure that we comply  
17 with the local and state laws. Next question.

18 QUESTIONER: Chris Willis [ph]. I have a  
19 couple of questions. The first one, how long will it take  
20 DARPA to reply to these applications?

21 PANEL: Two weeks. You turn them in on the 13th,  
22 and we are trying to turn them around the 1st of November,

1 if possible. What we are trying to do, more than anything  
2 else, is to have an iterative process so we can work with  
3 you. Our intent is to have you qualified on the 13th. So,  
4 hopefully, we have started the engagement process with you  
5 early, but if you are turning you paper in on the 13th, you  
6 can stumble.

7 QUESTIONER: I thought you said papers were going  
8 to be turned in on April the 1st. What 13th are you talking  
9 about?

10 PANEL: He is talking about the October 13th final  
11 deadline.

12 QUESTIONER: Yes, I understand that. I am asking  
13 when you turn in your papers on April 1st, how long is it  
14 going to take you guys to get back to us and say, okay, you  
15 are approved, or you are not, you know, that turnaround  
16 process?

17 PANEL: Two weeks. Two weeks, especially if you  
18 turn them in right away. I mean, I would like to point out  
19 that we may get a lot of papers turned in on the 12th at the  
20 beginning, and we will get it back to you in 2 weeks.

21 QUESTIONER: Okay. The second question has to do  
22 with the insurance again. Why are we required to be insured



1 at the time of submission of our paper and not just during  
2 the event?

3 PANEL: Your insurance doesn't have to kick in  
4 until the actual time of the event. What we are asking for  
5 is that you have made arrangements to have insurance that  
6 covers you at the event. Okay. Next question.

7 QUESTIONER: I am David Andees [ph] from  
8 Ridgecrest, California. I have a couple of questions. I am  
9 interested in any guidance you can give us on the kind of  
10 modifications that are going to be allowed after the  
11 technical paper has been accepted. For instance, if I say I  
12 am going to use two cameras and I decide to use three, does  
13 that throw me off?

14 PANEL: I will turn that over to Mike. Actually,  
15 I have been asked that question a couple of times today. As  
16 the rule is written now, you are not allowed to make any  
17 substantial changes after the 13 October deadline. There is  
18 certainly tweaking and tuning that would be going on at that  
19 point. Since a lot of you have already asked that, again,  
20 we are pointing out these rules are flexible, and it is  
21 something we could consider. I would consider it highly  
22 likely, we will give you an opportunity to submit

1 modifications. We will put details about that up on the  
2 website.

3 QUESTIONER: What are the rules concerning the  
4 damage to our vehicle caused by another vehicle? Do you  
5 have an idea how you are going to handle that?

6 PANEL: Okay. Somebody else asked me the  
7 question. I don't know if you all heard the question, so I  
8 will repeat it. What are the rules concerning damage to  
9 Team A's vehicle by Team B? All right. Right now, the way  
10 the rule is, Team B, number one, is out unless it was minor  
11 and unavoidable and, in the opinion of the field judge, it  
12 did not affect the competitiveness of Team A. Are you all  
13 following that? Sorry I am going so fast on that one. But  
14 the big question is what about the aggrieved -- is that what  
15 you call the vehicle that got hit? -- the aggrieved vehicle,  
16 okay. What is in it for them? There isn't a rule on that  
17 right now, and I have already made a note to myself that  
18 this needs to be investigated. So we are going to have to  
19 get back to you on that, but the hitter is out. I don't  
20 know what we do about the hit-ee yet. Sorry. Okay. Next  
21 question. Remember, these are critical questions. So  
22 please ask them. I am not saying we have all the answers,

1 but by the 1st of April, we are certainly going to have a  
2 group huddle and we will answer all of these questions to  
3 the best of our ability by the 1st of April so that you can  
4 move ahead. So please ask the hard questions.

5 QUESTIONER: David Peck. I think my question on  
6 proprietary information has been answered so far, but I will  
7 probably have more. But I will ask anticipating that nobody  
8 is going to win this first race and we resubmit our entries  
9 in subsequent years, what is going to be the procedure --  
10 that we start over after each race or submit technical  
11 papers with modifications?

12 PANEL: We haven't developed the rules for DARPA  
13 Challenge Two yet, obviously, but it would probably be a  
14 similar process, assuming it is going to go as planned. If  
15 you are submitting the same design that you had already  
16 submitted in a previous year, I would imagine it would be  
17 accepted pretty straightforward.

18 QUESTIONER: Okay. Any proprietary information  
19 that is disclosed after this first challenge will be  
20 protected in anticipating we will resubmit the entry.

21 PANEL: We will work with you to make sure the  
22 proprietary information is agreeable to both parties. Okay?

1 That is something we have got to go back and work, what  
2 constitutes that, how much can we give and play. So let me  
3 take that on. That is a good question. The insurance is a  
4 good question. Those two questions, I will go out and  
5 tackle. Next question, please.

6 QUESTIONER: My name is Brad Filkins [ph] from San  
7 Jose, and I was wondering what is the maximum depth on the  
8 water crossing that we are going to be expected to make, and  
9 is it mandatory or can we avoid it?

10 PANEL: The maximum depth will be up to Mother  
11 Nature because it could rain that morning or the evening  
12 before, and I believe that when we do actually give you the  
13 waypoints and what have you for the course, there might be a  
14 way that you could make the decision to go around it or  
15 straight through it. I think that will be part of the  
16 challenge that the survey team will build into the course  
17 itself. Next question.

18 QUESTIONER: I am Doug Blodgitt [ph] from Redondo  
19 Beach. I think you have alluded to it, but let me ask it  
20 specifically. Are there going to be any manmade markings  
21 for the boundaries or the waypoints?

22 PANEL: Not any we are going to tell you about.

1 They will just be there for the judges, so that the judges  
2 can tell whether the challenge vehicle complied with the  
3 waypoints that were designated. Certainly, we can't put  
4 chalk marks around a thousand waypoints, number one, because  
5 EPA probably doesn't want any chalk out there, and, number  
6 two, it is too hard. So whether we are going to sprinkle  
7 granola around it or something, we haven't figured out yet,  
8 but, yeah, they will be marked. But we are not going to  
9 tell you what the marking is. Only the judges are going to  
10 know.

11 QUESTIONER: Okay. So I guess, then, that the  
12 format of the waypoints is going to be the only information  
13 -- the format of the data given to us for the waypoints is  
14 going to be the only information.

15 PANEL: You are correct, but don't forget that the  
16 location of the checkpoint is going to be made known to all  
17 of the participants in time that you can make arrangements  
18 to get a hotel or pitch a tent or something and be ready to  
19 receive your vehicle. Next question, please.

20 QUESTIONER: Yeah. Bill McHarg [ph] from San  
21 Diego. I have a question on the E-stop. I understand an  
22 incoming signal to the challenge vehicle for emergency stop

1 -- I would like to know if it is acceptable to have two  
2 types of emergency stop. One is stop at all costs, you  
3 know, everything is going downhill there, and the other one  
4 would be if the judge or, for some reason -- I mean, they  
5 both would be considered stops and they have to follow the  
6 rules according to whether you are allowed to stop, but  
7 another one would say let the computer on board try to do it  
8 gently and stop in anticipation of going again.

9           PANEL: Mike, do you want to take this one? First  
10 of all, I would like to point out that -- let's just call it  
11 a hard E-stop right now. That doesn't mean you just close  
12 your eyes and slam the brake as hard as you can. We are  
13 anticipating if you are going at a significant speed, you  
14 may also want to keep steering as you are slamming on the  
15 brakes. I would assume when you are designing the system,  
16 you are going to anticipate that you are going to have to do  
17 an E-stop at some point on this course. So you don't want  
18 it necessarily to completely shut off all your system and  
19 then have to reboot and take a lot of time. So I would  
20 anticipate you would want to -- I am not exactly sure what  
21 you mean by a soft E-stop, but you always want to do it. I  
22 mean, I think stopping as fast as you can is not that great

1 of a risk that you can't do that every time that you need to  
2 engage it.

3           QUESTIONER: The interpretation of the word  
4 "emergency," if it is emergency, we have no idea what the  
5 computer is doing onboard. I would like to have an  
6 independent system on the thing that can go right to the  
7 actuators, bring the wheels straight forward, apply the  
8 antilock brakes or something like that, and kill the  
9 throttle, without relying on the computers knowing what is  
10 going on. That would be a real emergency. It is like stop  
11 at all costs.

12           PANEL: Are you talking about manually, a human  
13 telling the robot to do this, what you are calling a soft  
14 stop?

15           QUESTIONER: Yes. You would have two buttons in  
16 the chase vehicle. One is the big, red mushroom button, and  
17 the other one is a little yellow button that says come to a  
18 controlled stop as soon as you can, you know --

19           PANEL: The E-stop will only be engaged in an  
20 emergency situation. That is the point. I don't want a  
21 situation where you think it is going a little too fast for  
22 this turn.

1 QUESTIONER: No, no. I said following the same  
2 rules.

3 PANEL: So the only time it would ever be used is  
4 when there is an emergency. So I would imagine we would  
5 want it to brake as quickly as possible every time it is  
6 engaged. Okay. Next question, please.

7 QUESTIONER: I also had a question related to the  
8 stop, but the manual stop. No one seems concerned about  
9 being able to activate a manual E-stop at 100 miles an hour,  
10 but, yet, we are required to have one. So the question is  
11 if the manual E-stop is triggered accidentally because I hit  
12 something, does that count against my time?

13 PANEL: First of all, the purpose of the manual  
14 E-stop, the primary way of stopping a moving vehicle, of  
15 course, is with some sort of wireless. So the way you would  
16 normally stop the vehicle is with the wireless E-stop. The  
17 manual one is there, meant as totally a fail-safe. I will  
18 give you an example of when you would use it. Suppose the  
19 robot is disabled and you want to push it out of the way.  
20 The first thing I would do is I would walk up to the robot,  
21 I would hit that manual E-stop, just to make sure. It is  
22 just a backup to make sure that thing is really not going to



1 suddenly lurch and run over my foot or something. So that  
2 is really the purpose.

3 QUESTIONER: So it doesn't have to be activated  
4 while the vehicle is in motion.

5 PANEL: Well, it should be designed that if it is  
6 rolling towards the crowd or something, but I can't imagine  
7 how at 100 miles an hour you are going to push a button or  
8 whatever.

9 QUESTIONER: And neither could I.

10 PANEL: And I would encourage you to design your  
11 button in a way that a twig or a branch or something doesn't  
12 accidentally push it.

13 QUESTIONER: Well, that is the tradeoff between  
14 being easily accessible and avoiding accidental --

15 PANEL: My understanding, I have seen a lot of  
16 these robots and they have thought this out. I am just  
17 going to make a suggestion. I am not the rules guy. I hear  
18 what you are talking about. We have this situation all the  
19 time. We have manual E-stop on PerceptOR vehicles and on  
20 UGCV. You need to make sure that you put that -- I don't  
21 want to make a rules suggestion. My suggestion to the Rules  
22 Committee is they allow you to design the mushroom so that

1 it can't be accidentally hit. What I think we should be  
2 doing is making absolutely sure that 100 percent of the  
3 time, the wireless system works because that is the only one  
4 you are going to be able to count on if the vehicle is  
5 moving towards somebody or it is moving to damage itself.  
6 So that is just a suggestion to our group that the manual  
7 E-stop is one that ought to be there for safety when you  
8 happen to be operating with people around it and it is not  
9 moving, but as far as safety is concerned, once the vehicle  
10 is moving, the only one we should be counting on is a  
11 wireless one. Thanks, Scott. Next question, please.

12 QUESTIONER: Hello. My name is Franklin Berger  
13 [ph], and I am a free-lance photojournalist from West Hills.  
14 My question was actually voiced by my colleague, Dan  
15 Fitzgerald, who didn't want to wait in this long line, but  
16 Dan's question is, do any participants, including the  
17 million-dollar winner, forfeit the rights of their  
18 technology to the Government? And I am surprised no one  
19 asked this sooner. [Laughter.]

20 PANEL: Forfeit the rights? No. The current  
21 rules say that the papers that are published will be made  
22 public. Now, we don't take possession of the vehicle is my

1 understanding currently, the way that we are thinking. So  
2 the vehicle remains with the team to do whatever they like  
3 to do with it, but the technical paper that you submit will  
4 be published in some forum that would be considered public.

5 So you have to consider that as you are writing your  
6 technical paper and what you choose to include in it, with  
7 that understanding. Does that answer your question?

8 QUESTIONER: Well, was that a yes or a no?

9 [Laughter.]

10 PANEL: That is a no. Okay. Next question,  
11 please. I got the PA guy and the legal person talking to  
12 each other.

13 QUESTIONER: David McMillan [ph] from Silicon  
14 Valley. Is the intent that the paper is going to be  
15 released after the million-dollar prize is paid or after  
16 each year's race?

17 PANEL: Right now, it is after the event itself.  
18 So, even if there is no winner, the paper is still going to  
19 be published.

20 QUESTIONER: Regarding insurance, is DARPA going  
21 to require or even permit the field judge to sign a general  
22 liability waiver as is customary in a racing event?

1 PANEL: Truthfully, we haven't decided how we are  
2 going to handle the field judge in relation to insurance.  
3 We will let you know about that by April 1st.

4 QUESTIONER: Okay. One other question, if a team  
5 expects to use an air safety vehicle and the weather is such  
6 that VFR flight is prohibited, what is the plan?

7 PANEL: You should have a backup. That kind of  
8 tells me where you need to be putting a lot of effort into.  
9 Next?

10 QUESTIONER: Hi. Darryl Fox [ph] from SOUNDS-A  
11 [ph]. Can we make custom annotations or alterations to  
12 topo-maps? So, if our robot is using a commercially  
13 available topo-maps, can we add custom markings or avoidance  
14 areas [inaudible]?

15 PANEL: Right now, there is no -- okay. Let me  
16 repeat the question because I can barely hear you. I want  
17 to make sure everybody else can hear the question as well.  
18 You are asking whether you can take commercially available  
19 maps and modify those maps for your own use for the purpose  
20 of participating. Is that correct?

21 QUESTIONER: That is correct. I was under the  
22 impression that we could use commercially available maps.

1           PANEL: Are there commercially available maps of  
2 the area in which the challenge will take place, is that the  
3 question?

4           QUESTIONER: No. Can we, before the race, add  
5 custom areas for avoidance or --

6           PANEL: All right. As long as you -- let me  
7 rephrase the question. I have also got bad ears here. I  
8 understand the question to be can you take a commercially  
9 available map and modify it for the purpose of competing,  
10 and the answer is yes, except that you cannot use classified  
11 information to put on that map. Did that answer your  
12 question?

13           QUESTIONER: Yes, it did. Thank you.

14           PANEL: Okay. Next question, please.

15           QUESTIONER: Dave Weber, Lancaster, California.  
16 My primary question was answered, but the secondary question  
17 is on the waypoints. I understand that the plan is to have  
18 them completed sequentially. However, if a vehicle misses a  
19 waypoint and recognizes that it has missed a waypoint, is it  
20 able to backtrack and cover that waypoint and continue on or  
21 does it have to re-sequence the waypoints?

22           PANEL: Mike? I think the general idea is yes,

1 that you need to go in sequence and for the reasons cited,  
2 safety, compliance with land use, et cetera. So, yes, I  
3 think the idea is that you do need to do them in sequence.  
4 Some areas where safety is going to be a real problem, you  
5 may even see waypoints that are very, very close together  
6 just to help you out, keeping in mind that following  
7 waypoints alone isn't going to be sufficient. Next  
8 question, please.

9           QUESTIONER: David Gawkins [ph], Robotics Society  
10 of America. Two questions. First, are there any provisions  
11 for radio frequency assignment for the E-stop, since many  
12 people will probably be using similar channels? It might  
13 happen that one team has to E-stop their vehicle and that  
14 radio signal may be on the same freq as another team's  
15 E-stop. Are there any provisions for assigning channels or  
16 some such?

17           PANEL: You will not be assigned channels up  
18 front. What you are going to do is when you submit the  
19 technical paper, you are going to describe what system you  
20 are using. For example, if you are using a commercial  
21 system, that will be real straightforward. If you are doing  
22 something yourself, you can tell us what frequency you are

1 going to be operating on and that kind of thing. We are  
2 then going to look at all the teams and what they have  
3 submitted to make sure there aren't any conflicts, and if  
4 there are conflicts, DARPA will do the deconfliction and let  
5 you know. That is another incentive to get your paper in  
6 early. Frequencies will, more or less, be assigned on a  
7 first-come-first-served basis, as long as you reasonably  
8 can't claim to have the entire bandwidth for yourself.

9 QUESTIONER: Second question, what are the  
10 provisions for chase vehicle breakdown? If the chase  
11 vehicle gets a flat tire and the autonomous vehicle keeps  
12 going [inaudible].

13 PANEL: The challenge vehicle would have to be E-  
14 stopped until the tire was fixed.

15 QUESTIONER: Does the driver of the safety vehicle  
16 have to be SCORE-compliant? In other words, does he have to  
17 have particular training or wear special equipment?

18 PANEL: The individual needs to be someone pretty  
19 special. I would highly suggest anyone that is thinking of  
20 entering the contest to contact some of the SCORE drivers  
21 and have them be your safety vehicle driver. As far as him  
22 being tested or having to have a SCORE license, no, that is

1 not required at this time.

2 QUESTIONER: On obstacles, will there be any  
3 moving obstacle intentionally placed on the  
4 route[inaudible]?

5 PANEL: Okay. No. Wow. When you say  
6 "intentional," certainly there will be other vehicles on the  
7 route. There are going to be other challenge vehicles.  
8 There are going to be other safety vehicles. Well, those  
9 are there intentionally, but if you are asking if DARPA is  
10 going to have those little pop-up deer that run across, we  
11 are not going to have those. [Laughter.]

12 QUESTIONER: Is there a maximum dimension for  
13 obstacles?

14 PANEL: Maximum dimension?

15 QUESTIONER: Yes.

16 PANEL: Mountains? Do you mean like height?

17 QUESTIONER: Yes.

18 PANEL: Well, we are not specifying a maximum, no.

19 QUESTIONER: Everything will be natural?

20 PANEL: No, I can't say that. I can tell you that  
21 we don't have any firm plans to build something out there  
22 like an erector set. It might be that we have to get a



1 truckload of gravel and put it in front of something for  
2 safety reasons, that the vehicle would either avoid and if  
3 it doesn't avoid it crashes into the gravel and stops. You  
4 know, we are leaving it open. There are a lot of natural  
5 obstacles out there, but it is not going to be like  
6 miniature golf or anything. Let me take that on. The  
7 bottom line is that we probably won't need to build  
8 anything. Mother Nature has provided plenty of obstacles.  
9 Just moving your vehicle from Point A to Point B is going to  
10 be challenging enough. The speed and distance is a  
11 challenge. So, right now, the answer is we will reserve the  
12 right, and you will find out on the day of the event. Okay?

13 QUESTIONER: At the start, when -- I haven't seen  
14 this in any of the documentation yet, but at the start, how  
15 close and what will be the spacing of the vehicles?

16 PANEL: I would say that would be determined by  
17 the number of entries. There could be the potential that we  
18 would start every 30 seconds, one at a time, or every half  
19 an hour, or we might do a land rush start, four abreast, and  
20 go towards a point that you will have to narrow down and one  
21 is going to have to let off or three are going to have to  
22 let off and the others are going to get through. But at

1 this point, it really is going to be how many entries we  
2 receive.

3 QUESTIONER: The reason why I ask if there is any  
4 active emissions from competing vehicles, if that causes  
5 some confusion or maybe erroneous operation of the vehicles,  
6 if there is going to be a minimum spacing.

7 PANEL: All right. So you are asking if the  
8 vehicles end up so close laterally that they present  
9 problems for each other. Is that the question?

10 QUESTIONER: Yes.

11 PANEL: Well, you can get real close. I mean, you  
12 can't beat the record, but you can tie it, for getting  
13 close. [Laughter.] Let me just point out, we are not sure  
14 how many vehicles we are going to have enter. We are not  
15 sure what the starting departure point is going to look  
16 like. If it turns out we have a mile-wide start line and  
17 two vehicles, the situation you just brought up is not going  
18 to happen. If it turns out we have a very narrow start line  
19 and a lot of vehicles, we will think of something else. We  
20 are going to take those considerations in mind. I don't  
21 expect that to be a problem. In terms of developing your  
22 sensing capabilities, it will probably be beneficial to have

1 some sort of sensing laterally.

2 QUESTIONER: Brian Reed [ph]. I had a question  
3 about collision of vehicles. Are there going to be any  
4 transponders or anything on vehicles to help collision  
5 avoidance? How can you tell like a stopped vehicle from a  
6 boulder, per se?

7 PANEL: Mike, do you want to take that one? Okay.  
8 The question is: Is there any kind of a transponder that  
9 is going to be put on vehicles to help avoid collisions? Is  
10 that the question?

11 QUESTIONER: Yes. Yes, that is it.

12 PANEL: Okay. No. [Laughter.] Well, a  
13 transponder is a two-way radio, and your vehicle is not  
14 allowed to receive data. Next question, please.

15 QUESTIONER: There was a phrase in the  
16 presentation on rules about two-way signaling permitted  
17 within checkpoints, but at the same time remote control of  
18 the vehicle is not permitted. So I didn't understand what  
19 was meant by that.

20 PANEL: Autonomous two-way signaling. No tele-  
21 operation. No human-in-the-loop tele-operation.

22 QUESTIONER: But it said two-way signaling is

1 permitted. What did that mean?

2 PANEL: That means you can do handshakes and  
3 beaconing between your gas pump and your bot as long as no  
4 human is doing the tele-operation.

5 QUESTIONER: Okay. On the issue of obstacles, I  
6 think wire is kind of a special class of obstacle that  
7 typically needs special sensors. It might be useful if you  
8 could tell us whether or not to anticipate wire obstacles.

9 PANEL: Currently, there are gates that you are  
10 going to be going through, cattle guards, and adjacent to  
11 the fence or -- excuse me -- adjacent to the gate will be  
12 wire on either side of it. So there is wire on the course.  
13 There is good old cowboy barbed wire.

14 QUESTIONER: That is a major safety issue. If I  
15 miss a fence and I run into that, there is a chance that I  
16 could injure everybody in the vehicle by hitting a  
17 barbed-wire fence at 50 miles an hour.

18 PANEL: Let me just say this. I hear your  
19 question. First of all, we have said something in the rules  
20 there that we are going to traverse the intended course with  
21 a 4-by-4 pickup truck. So we are taking every measure to  
22 run the course. We are taking every measure to clear folks

1 from the course. We are doing everything we can to make it  
2 as safe as possible. So, from our perspective, the course  
3 layout will be safe to run on that particular day. Do you  
4 have anything to add to that, Sal? No. That really is the  
5 bottom line. I think that is it. Okay. Next question,  
6 please.

7 QUESTIONER: Hi. My name is Triston Crees [ph].  
8 I am from ISE In Vancouver, Canada. I had three questions,  
9 but one has been answered. The other one, the E-stop, no  
10 one has really mentioned what the maximum stopping distance  
11 is. I can activate an E-stop and my vehicle could brake  
12 immediately, but say in this environment, it can be hundreds  
13 of meters before it actually stops. A vehicle that is  
14 doing, say, 50 miles an hour, how much distance do we have  
15 to stop in?

16 PANEL: There is not a quantitative restriction.  
17 You are required to make the robot stop as fast as it can.

18 QUESTIONER: Because that does imply that you  
19 might activate the E-stop immediately on becoming aware of  
20 the situation and still wipe out the crowd.

21 PANEL: Hopefully, that won't happen. We  
22 certainly are going to design the course to where you are

1 not heading straight for a crowd at 100 miles an hour and  
2 then have to make a sudden left turn and if you don't make  
3 it, then we engage the E-stop. We will certainly take that  
4 into consideration.

5 QUESTIONER: So, at this point, there is no  
6 maximum requirement on the E-stop?

7 PANEL: There is just from a reasonable  
8 standpoint. If it takes you 2 miles to stop, it is not  
9 going to be acceptable. It should be the equivalent, I  
10 mean, I know you may not have wheels, but it will be the  
11 equivalent of slamming on your brakes in the car. It has to  
12 be something along those lines.

13 QUESTIONER: Okay. My second question is more  
14 curiosity. If this does go to multiple years, will it  
15 continue to be L.A. to Las Vegas or could it be in other  
16 types of geographical terrain?

17 PANEL: Mike, the question is multiple years and  
18 the route. I just point out the actual course, the series  
19 of waypoints will certainly change year to year, in case  
20 that is not obvious.

21 QUESTIONER: No. I mean, is there potential for  
22 snow and ice?

1           PANEL: That has not been decided yet. That  
2 question is still open. A lot of discussions within the  
3 committee to come back to the area, a lot of discussion, 50  
4 percent of it, says lets go do another route. So that is  
5 open. The bottom line is if no one wins, we are going to  
6 follow it up with another Grand Challenge, and that is the  
7 critical point. Next question.

8           QUESTIONER: All right. Thomas Eaton [ph]. This  
9 is regarding when the challenge vehicle is on the surface  
10 streets. Sal, you had mentioned something about traffic  
11 signals. Are the challenge vehicles required to obey the  
12 basic road rules when they are on the surface streets or can  
13 they ignore them?

14          PANEL: I hate to use the word "ignore," but our  
15 plan is whenever we are on an existing street, that street  
16 will be closed down for a period of time while the entry is  
17 on the street, and that means the traffic lights or side  
18 streets, so that you will not be concerned about oncoming  
19 traffic or side traffic or passing a truck or anything like  
20 that.

21          QUESTIONER: So the challenge vehicle can just go  
22 through stop signs, red lights, et cetera?

1           PANEL: Correct. Hopefully, the stop signs will  
2 be green -- or the traffic lights will be green, but if  
3 there is a situation, obviously, that we cannot do that --  
4 and I don't think that is going to happen -- that will  
5 somehow be built into the program that they are going to  
6 give you 2 hours before that you will have to come to a  
7 stop. Next question.

8           QUESTIONER: I have two questions. Can we send a  
9 signal to the robot to notify it about the time that won't  
10 be counted against us for E-stops as directed by the judge?

11          PANEL: Can you repeat your question?

12          QUESTIONER: Can we send a signal to the robot to  
13 notify it about the time that will be not counted against us  
14 for E-stops as directed by the judge? Just basically --  
15 because the judge is telling us something that the robot  
16 needs to know if we are going to have -- with time frames.

17          PANEL: No.

18          QUESTIONER: Okay. Could SCORE or DARPA let us  
19 know where we could go to possibly do testing for the  
20 vehicle, similar courses, stuff like that, for the rest that  
21 aren't off-road people? Just something on the website or  
22 something like that.



1 PANEL: Yes, we can. We could be more than happy  
2 to, and we will have it on the website of different  
3 locations in Arizona, Nevada, California, and Baha. Okay.  
4 Thank you. Next question.

5 QUESTIONER: My name is Muzi Oran [ph], Lopel Beat  
6 [ph], Israel. I have two broad questions. One is we do  
7 have a fully owned U.S. subsidiary. Can we use that as the  
8 main vehicle or main thing?

9 PANEL: Is your subsidiary incorporated in the  
10 United States?

11 QUESTIONER: Oh, yes.

12 PANEL: Okay. Yes. Then it will be considered an  
13 American company.

14 QUESTIONER: Okay. I don't need another  
15 corporation?

16 PANEL: No.

17 QUESTIONER: Good. [Laughter.]

18 PANEL: You can if you want, but no.

19 QUESTIONER: In this same vein, we do not use any  
20 U.S. Federal funding, but we do use Israeli Government  
21 funding for our program. [Laughter.]

22 PANEL: Negative. Next question. Really, no.

1 QUESTIONER: It is very minimal funding, but still  
2 -- [Laughter.]

3 PANEL: We will take that under advisement, but I  
4 don't think so. We are going to think about that one.  
5 Let's lean towards a no.

6 QUESTIONER: Secondary question is the commercial  
7 availability of some trails. There was a question about  
8 maps. How about aerial photography? If we use a local,  
9 commercially available aerial photography service ahead of  
10 time, is that okay?

11 PANEL: Yes. The question was can you use  
12 commercial imagery, aerial imagery, and the answer is yes.

13 QUESTIONER: What I mean is photography that we  
14 order, we ourselves do it with a commercial company, a local  
15 commercial company.

16 PANEL: Yes. If it is available to the public and  
17 anybody can order that imagery just the same as anybody can  
18 order a map or anything, yes. The answer is yes. Next  
19 question.

20 QUESTIONER: Hello. My name is Anthony  
21 Levindowski [ph] from UC-Berkeley. My first question is:  
22 Is it DARPA's intention to run the course in areas where

1 regular GPS signals are not available?

2 PANEL: Let me just say the preliminary runs on  
3 the various tracks, we have received GPS. So that is not an  
4 issue for me at this time. Will we come across that as we  
5 further investigate the various routes? Possibly, but we  
6 will let you know.

7 QUESTIONER: My second question is you said that  
8 the vehicles cannot receive any data. How do you consider  
9 -- I mean, GPS is satellite time information.

10 PANEL: Right.

11 QUESTIONER: The other question related to that  
12 is: Are you allowed to have a satellite communication or  
13 communication with other robots without involving humans?

14 PANEL: The answer to the first question about  
15 whether a robot can receive GPS data or any freely available  
16 public radio-positioning service, GPS is an exemption, any  
17 radio-positioning system is an exemption for the kind of  
18 data that the challenge vehicle can receive. Your second  
19 question, I think, is: Is your challenge vehicle allowed to  
20 collaborate with other challenge vehicles? Was that the  
21 second question?

22 QUESTIONER: Well, what if I set up as public

1 system on my vehicle to broadcast out positioning  
2 information? Can I use another challenge vehicle to receive  
3 that information?

4 PANEL: No. It is because it is not freely  
5 available to the public. The question is you are going to  
6 have two challenge vehicles, and you want to transmit  
7 information from one to the other. Is that what I heard?

8 QUESTIONER: Well, from one to anybody that wants  
9 to listen in to it.

10 PANEL: Negative. Negative. Thanks. Let's move  
11 on. Appreciate the question. Good try, but it is a  
12 negative. As a follow-up to that, I would also point out,  
13 there is no team work at all between -- you know, you are  
14 free to field two vehicles, but they cannot cooperate in any  
15 way, not just they can't send signals. You can't have one  
16 push the other one out of the hole if they get stuck or  
17 something like that. There is no cooperation. Next  
18 question, right up front.

19 QUESTIONER: My name is Philip Tau [ph]. I am  
20 from Los Angeles. My question is regarding the boundaries  
21 of the race course. It is my understanding, you are going  
22 to supply waypoint information in the forms of latitude and

1 longitude along the race, but if we have two waypoints and  
2 say a cliff in between, how far can we sort of go laterally  
3 and around the cliff before we are disqualified? Is there  
4 information in the actual text for boundaries of the race  
5 course? Are you going to provide that along with the  
6 waypoint information?

7           PANEL: Yes. That information will be provided in  
8 the dataset that you get 2 hours before the event, and I  
9 showed a slide up here of just a notional format. I am  
10 soliciting input for how people would like to see that - as  
11 it was displayed or how they would like to have them  
12 presented and also what kind of media, if you could just  
13 e-mail in to grandchallenge@darpa.mil and let us know. Next  
14 question in the back.

15           QUESTIONER: Ted Hoodako [ph] from San Francisco.  
16 This might actually be an elaboration on the previous  
17 question from back here. What is your expectation for GPS  
18 or rather differential GPS and specifically WAAS coverage  
19 over the entire course? Also, what is the circular area  
20 error radius for the vehicles passing checkpoints? The  
21 reason I am asking the question is that the U.S. Coast Guard  
22 website indicates that significant areas of the Mojave are

1 not covered by WAAS.

2           PANEL: The first question, is GPS going to be  
3 assumed over the entire course, the answer is no. There are  
4 many types of systems. We are not going to tell anybody  
5 that they have to use GPS. We are going to give coordinates  
6 in WGS-84 reference spheroid. Whether you use a GPS, an  
7 INS, or a star tracker to figure out where you are, it is  
8 totally up to you. Keep in mind that the error that you  
9 just described with or without WAAS is something that we are  
10 working on right now. I mentioned earlier that I don't know  
11 yet what the radius of the permitted circle around the  
12 waypoint is going to be. We are working on that, and we  
13 will present that information as soon as we can.

14           QUESTIONER: Can you at least guess within order  
15 of magnitude? Is it 1 meter, 10 meters? Is it 100?

16           PANEL: I would say in the neighborhood of 10  
17 meters. Okay. Next question in the front.

18           QUESTIONER: Ken Diffanee from Edwards Air Force  
19 Base. A question regarding the technical design. I spent  
20 time writing the paper already, and since it is such a short  
21 design cycle, is there a way that we can list what you  
22 consider are going to be mandatory on the technical design

1 and then say this would be nice if we have time to complete  
2 it, include that in with the proposal? That way, if we show  
3 up to the door, we are going to have a minimum amount of  
4 equipment to do the race, but if we have these extra  
5 sensors, it would help the vehicle be a little bit better,  
6 then that would be fine. Obviously, if it is not in the  
7 optional list, then we are breaking the rules. I am just  
8 trying to get a little bit more -- so we are not trying to  
9 resubmit every time an addendum to add a new sensor or, you  
10 know, to go through that process.

11           PANEL: If you're talking about new software or  
12 something like that. You can try it out and see if it  
13 works, and you can propose that. It most likely would be  
14 accepted as long as it is not something outrageous. Things  
15 like sensors are pretty much always going to be accepted, as  
16 long as there is no way to use it and to cheat in any way.  
17 The one thing I do need is a final version of what you are  
18 going to have, so that we can expect it and compare it to  
19 what that is.

20           QUESTIONER: Okay. And I have one more question.  
21 This regards more to the safety not with the barbed wire.  
22 That is another issue. It is with a 3-second dead-man stop.

1 I fly both Global Hawk and UCAV, and Global Hawk has a  
2 6-second timer. I stayed up until 2:00 last night reading  
3 the new rules. They were a lot different than the website.

4 You guys have proposed a 3-second dead-man stop.  
5 If your vehicle comes over the top of the hill, drops over  
6 the top of the side and then just starts slamming on the  
7 brakes and we are trying to catch up to it, it is going to  
8 look like a L.A. Freeway on a foggy day in Salinas,  
9 California. You are going to have vehicles just running on  
10 top of each other, especially if we are trying to achieve 50  
11 miles an hour.

12 PANEL: I am aware of this concern, and regarding  
13 what you are talking about is the delay between the  
14 activation of the emergency stop and when the vehicle itself  
15 executes that command. Is that what you are talking about?

16 QUESTIONER: Yes, that is right. I am not saying  
17 that it has to be 3 seconds and I am not saying it should be  
18 50 because that is unrealistic, but it needs to be something  
19 in between that, a little bit better than 3 seconds. I  
20 would say somewhere between 5 and 10 would be realistic.

21 PANEL: We totally agree that we need to  
22 investigate this. It is a good point, and I promise you, we



1 will. Next question in the back, please.

2 QUESTIONER: Michael Johnson with the Ultimax [ph]  
3 Group. This is a couple of questions about insurance.  
4 First of all, with the --

5 PANEL: A couple insurance questions?

6 QUESTIONER: Yeah. With the rules, when do you  
7 expect the rules to stabilize given that there may be  
8 changes? Certainly sometime before April 1 would be  
9 helpful.

10 PANEL: Well, April 1 is only a month away. So we  
11 are taking all of your questions under advisement and any  
12 more that come in. I don't think that is an unreasonable  
13 length of time, but we can't guarantee that they will  
14 stabilize before then.

15 QUESTIONER: Okay. A little commentary before the  
16 second question. Currently, the California Vehicle Code  
17 says it is illegal to drive a driverless vehicle on roads,  
18 and insurers don't provide insurance for illegal activity.  
19 So that is an interesting problem. The fact that we have  
20 the possibility within the new rule change, there is a  
21 possibility of non-participants being on the route. That  
22 creates a tougher design standard to make the vehicles

1 courtroom-proof rather than battlefield-proof. So the  
2 question is: When will the insurance requirements for this  
3 event be made reasonable?

4           PANEL: First of all, about the California law, we  
5 are not going to be running these vehicles on public roads  
6 while the public roads are open. We are going to get a  
7 permit to hold a special event. For example, during the  
8 Rose Bowl Parade, the floats may not be licensed and  
9 registered vehicles, but you get a permit to close down that  
10 public street and to do what you want. The same thing would  
11 happen in Sal's events. His vehicles aren't publicly  
12 licensed vehicles to run the road, but if you close the  
13 road, it is okay. I am not sure, your question about  
14 allowing other people on the course, that is not our  
15 intention. The public roads certainly will be closed. The  
16 trails will, to the best of our ability, be cleared. We are  
17 not going to allow anyone on the course, but we can't  
18 guarantee with 100-percent certainty that we won't have any  
19 stray civilians coming into the area.

20           QUESTIONER: Certainly, you can see the concern we  
21 have. Somebody gets hurt. They go to sue, and they are  
22 going to say, "Hey, you were doing illegal activity."

1 Insurance companies are in the business not to pay out.

2 They are only in the business to take.

3 PANEL: There is no illegal activity here. We are  
4 going to get permits to use the roads for this purpose. So  
5 there is nothing that is going to be illegal here.

6 QUESTIONER: I understand that will be an argument  
7 that the prosecution will use. Right? Thank you.

8 [Laughter.]

9 PANEL: Once again, let me foot-stomp. We are  
10 working with the local, state, and national level. So we  
11 are going to comply with all of the rules. Wherever we need  
12 to, to get a special permit, we will go after those special  
13 permits. So we are going to make this event as safe as  
14 possible. Insurance is a major question, and we have got to  
15 address that before the 1st of April. Next question,  
16 please.

17 QUESTIONER: I had one on my card here, but I need  
18 to follow up your answer to the distinguished gentleman from  
19 Israel. I believe you told him that he could hire a  
20 commercial surveying company to survey the course between  
21 the 2 hours that the waypoints are released and the start  
22 time of the course.

1           PANEL: No, no, no. Before that. Months before  
2 that.

3           QUESTIONER: Months, 2 hours. What is the  
4 difference? Where is the deadline? At what point can we no  
5 longer survey the course?

6           PANEL: You won't know what the course is until 2  
7 hours beforehand, but if you wanted --

8           QUESTIONER: That is plenty of time for me to take  
9 aerial photos of a 250-mile stretch.

10          PANEL: Then, fine.

11          QUESTIONER: That's fine? I'm sorry? Is that --  
12 that's okay?

13          PANEL: Right now, you will not know the course  
14 route until 2 hours prior. What you do in that 2 hours, I  
15 am going to leave it up to you to decide. Next.

16          QUESTIONER: Hi. I am Dave Thomas with Gadget  
17 Man, L.L.C., out of Colorado, and I only have one question  
18 here. This deals with the waypoints. If you have been out  
19 in the desert on the little trails and stuff, the little  
20 small roads, there are little forks branching off  
21 everywhere. Are the waypoints going to be set up to try and  
22 keep us from like taking a wrong turn, or will it have to

1 have the intelligence of "Gee, I am going away from where I  
2 should. It is time to turn around and go back"? Will it  
3 have to choose a number of forks in the road to get from one  
4 waypoint to the next?

5 PANEL: There is no guarantee that by -- okay.  
6 Let me just repeat the question to make sure I got it right.  
7 The question is: Are the waypoints going to be set up in  
8 sequence in such a way that if you pass through every  
9 waypoint, you will not go off the course? Is that it?

10 QUESTIONER: Yeah, pretty much. If it is between  
11 two waypoints, there is a fork in the road, and you have a  
12 choice of either going the wrong way or the right way, like  
13 will it be set up so that that mistake is possible, I guess,  
14 is really the question.

15 PANEL: Well, if you take the wrong fork, you  
16 won't make it to the other waypoint, right?

17 QUESTIONER: Well, yeah. So -- okay. I guess  
18 that pretty much answers the question. [Laughter.]

19 PANEL: Yes, it does. All right. Let's move on.  
20 Next question.

21 QUESTIONER: Hey, I am Zack Chambers from Rose  
22 Holman [ph] in Terre Haute, Indiana. One short, easy

1 question. Will the slides from today be posted on the  
2 website, particularly the ones from Sal's presentation?

3 PANEL: Let me address that. The bottom line is  
4 that all of the presentations seen today will be posted on  
5 the website. Okay? We will make sure that we have got an  
6 updated roster. I did promise that we will pass out the  
7 roster. I was informed by my staff that the roster that you  
8 will get this afternoon is everybody who has registered by  
9 the 21st of February, and so I know we have got a lot of  
10 newcomers that came in. So your name will not appear on  
11 that roster. However, when we get the roster on the web  
12 page, it will have a complete list. Okay?

13 QUESTIONER: Chris Manson, Los Angeles. Will  
14 there be logistical support to get dead vehicles off the  
15 course and get them back to a paved road or civilization in  
16 the most efficient way possible, or will the chase vehicle  
17 have to be responsible for trailering it or be able to  
18 remove that vehicle from the course?

19 PANEL: There will be no Government logistical  
20 support provided to move the challenge vehicles or the  
21 safety vehicles. There may be some Government logistical  
22 support, nothing promised, for such common items as

1 port-o-potties, water, stuff like that, but the answer to  
2 the logistical question is no. Next question.

3 QUESTIONER: In order to use a commercially  
4 available map, we need to obviously put it into a form  
5 usable by a computer. Are there any restrictions placed on  
6 the formation of sophisticated software maps such as  
7 creating -- if there is a road on a map, you can make that  
8 into an object and have various properties that you program?

9 And can we add information other than that which is on or  
10 implied by a commercial map? Like could we go drive there  
11 and find a rock and say I don't want to hit that rock and  
12 put that rock onto our software map?

13 PANEL: The first part of that question, you are  
14 allowed to modify the maps, and by that, I mean you can look  
15 at the map and draw areas. Like we said before, don't go  
16 there [inaudible] equipment beforehand. Don't even think  
17 about going in this area. In terms of rocks, I don't think  
18 rocks would ever show up on any -- I am not sure what size  
19 rock you are talking about, but if we are talking this big,  
20 it is not going to be on the map in the first place.

21 QUESTIONER: I know it wouldn't be in a  
22 commercially available map, but if we found a rock, can we

1 put that into our map?

2 PANEL: You mean you are proposing to go find all  
3 the rocks in between L.A. and Vegas beforehand?

4 QUESTIONER: Yes. [Laughter.] I could, for  
5 example, drive, drive around --

6 PANEL: Here is the issue, though. You are  
7 implying that you are going to have access for a pre-run.

8 QUESTIONER: No, no, no, no. Just drive. I can  
9 drive around in the desert and find rocks and map them. Is  
10 that --

11 PANEL: Okay. You can do whatever you want to  
12 with a map. The answer to that question is yes, but you are  
13 not going to pre-run the course. Okay? Next question.

14 QUESTIONER: My name is Salem Pallesini [ph] from  
15 San Francisco, California. You specified that waypoints  
16 will be provided as latitude, longitude data. What would  
17 happen if one of these waypoints is set within a GPS dark  
18 spot because of geography or whatever, and would this be a  
19 legal possible waypoint?

20 PANEL: Just a moment here. I am going to make  
21 sure we have the right answer. [Pause.] The question is:  
22 Is it possible that there might be a waypoint that we



1 designate that, at the moment you arrive in the vicinity of  
2 the waypoint, you cannot receive GPS? Is that the question?

3 QUESTIONER: Let's say you set up a waypoint in a  
4 canyon, in a riverbed in the bottom of a ditch that a normal  
5 GPS with normal antenna will not be able to get reception  
6 down there. So the waypoint is there and the location  
7 exists physically, but it is impossible to make sure that  
8 you are on it.

9 PANEL: Right. I understand. You should not  
10 assume GPS reception at any of the waypoints. I mean, we  
11 certainly can't guarantee that. It is imagined that many,  
12 if not all, of the participants will rely on GPS, but we  
13 certainly can't guarantee that each waypoint is going to  
14 have good GPS coverage. Certainly, if a waypoint, you can  
15 imagine, is designated under an underpass, that you would  
16 not be able to get that.

17 QUESTIONER: Okay. Second question is -- this is  
18 following up to somebody else's question that it would be  
19 very difficult to distinguish from a broken-down robot and a  
20 boulder or something like that. So, in the bottleneck  
21 situation in which the broken-down challenge vehicle is  
22 blocking the whole course within the boundaries, how is this

1 to be handled? Because suddenly you cannot tell it is a  
2 robot, and suddenly your course within boundaries has a  
3 5-feet-tall obstacle that it is impassible. So are you  
4 supposed to get off boundaries and risk penalization just to  
5 go around it? Are there going to be beacons? Somebody said  
6 transponders, and that was his catch. Are there going to be  
7 beacons on the robots that would distinguish them from an  
8 inanimate object?

9           PANEL: Okay. I think we have got the question.  
10 Do you want to try that one? Okay. Let me go to the  
11 beacons for a second because I have gotten a question that  
12 was sent up here asking about having beacons.           We have  
13 an idea that we haven't firmed up yet, but those of you who  
14 have read the rules see that there is a requirement to  
15 provide 12 to 14 volts on top of the -- or somewhere on the  
16 vehicle. The idea is we may, if everybody agrees, want to  
17 put a small beacon up there to broadcast the position of the  
18 bot, so that it could be web-cast. Okay? That has got  
19 nothing to do with any beacon used for collision avoidance  
20 or anything like that. We also have no intention of putting  
21 any beacons on any rocks or boulders. Your question did --  
22 part of your question related to coming up on a disabled

1 vehicle in the middle of a narrow trail. Is that correct?

2 QUESTIONER: Yes.

3 PANEL: Okay. If that happens and the vehicle  
4 hasn't moved in 10 minutes, the vehicle is disqualified. It  
5 is not in the Grand Challenge anymore. It is over. You can  
6 touch it. You can move it. You can move it outside the  
7 boundary because you are permitted. When we get these land  
8 use authorities, if it is a narrow boundary, the boundary  
9 exists for the purpose of Grand Challenge. That vehicle  
10 isn't in the Grand Challenge anymore.

11 QUESTIONER: The question was more like to the  
12 point of if it is a robot that is stopped because it is re-  
13 plotting its map or something and it will take 4 minutes --

14 PANEL: I think we have answered that, and the  
15 bottom line is if the robot is in front of you, that robot  
16 has got 10 minutes to move. If it doesn't move in 10  
17 minutes, that safety team will move the robot, and the  
18 following robot will pass. Okay? Thanks. Next question,  
19 please.

20 QUESTIONER: Well, both of those questions kind of  
21 segue into mine. The first one is: What is the penalty for  
22 missing a waypoint?

1           PANEL: Mike? It hasn't been established yet.  
2 The penalties, we are still working on the nature of the  
3 penalties. As you go through the rules, you say it is  
4 mandatory. You do this and that and the other thing. The  
5 next step is to develop a table and to decide what an  
6 appropriate penalty is. So, if you miss a waypoint, I don't  
7 know yet. We don't have that. It may depend on the field  
8 judge saying, "Look, the waypoint is a mile over here and  
9 you didn't hit it." Perhaps that would be a  
10 disqualification.

11           QUESTIONER: Well, in downhill skiing, you are  
12 assessed a time penalty for missing a gate or something. So  
13 I had that analogy.

14           PANEL: The penalties, I would imagine would be  
15 time penalties for certain undesirable behavior. For the  
16 most egregious behavior, it would be disqualification, such  
17 as ramming into another vehicle and knocking it out of the  
18 event. Good question.

19           QUESTIONER: The second question is in considering  
20 collision avoidance and that kind of thing, if I may extend  
21 it to courtesy on the track, why not apply California DMV  
22 rules to the vehicles? The guy on the right has the

1 right-of-way and that kind of thing.

2 PANEL: Where in California do they do that?

3 [Laughter.]

4 QUESTIONER: In the rules.

5 PANEL: You had rules, huh? Okay. Next question.

6 Thank you.

7 QUESTIONER: Well, actually what simplified making  
8 up the rules to the collision avoidance logic.

9 PANEL: No, I hear you. We will take that on and  
10 look at it. Next question, please.

11 QUESTIONER: David Gawkins. Regarding the  
12 starting position, if, for example, there are 40 vehicles  
13 that are entering the contest, how are they going to start?  
14 Are you going to have staggered starting in terms of the  
15 time or is there going to be pole position?

16 PANEL: Let me answer that. Right now, that is  
17 still under advisement. We are going to work that. We do  
18 not know how many entrants we are going to have, but if 40  
19 vehicles enter, our concern is if you do the land rush and  
20 then you start narrowing down to the waypoint designation --  
21 I want the vehicle to complete the event, not to be bumping  
22 with each other along the route. So that is something we

1 are going to have to take under advisement and work the  
2 details for. So there are two options: land rush or  
3 separate them by a time, as Sal mentioned earlier. We are  
4 going to work both of those. Next question.

5 QUESTIONER: Watson Straining [ph] from Berkeley.

6 I have two questions on sensors. The first one is if we  
7 are using radar on the robot, are there frequency bands that  
8 have been allocated, and also the power limits, what is  
9 going to be the policy on that?

10 PANEL: Mike? You are referring to the E-stop.  
11 Is that right?

12 QUESTIONER: No. Sensors.

13 PANEL: Oh, radar.

14 QUESTIONER: Right. So we are concerned about  
15 interference with other radars.

16 PANEL: Right now, of course, you have to comply  
17 with any FCC regulation, but other than that, we are not  
18 giving you -- allocating you bandwidth or anything like  
19 that. So it may be something for you to consider. Let me  
20 take that on. The answer is no, we haven't looked at it  
21 carefully. We will take that on.

22 QUESTIONER: Okay. I have a second question. If

1 the vehicle has a pod that can go up, you know, it is an  
2 integral part of the vehicle, it will go up [inaudible],  
3 come back and then the data would be captured and the  
4 vehicle will do the necessary navigation, is that allowed?

5 PANEL: Are you talking about tethered or  
6 untethered?

7 QUESTIONER: It is untethered. I can go up and --

8 PANEL: Definitely, untethered, no. Just for  
9 safety reasons, really. We are having enough trouble  
10 keeping track of one vehicle. We don't want two, especially  
11 when one is flying all over the place. Next question in the  
12 back.

13 QUESTIONER: Eric Chateau [ph] from UC-Davis.  
14 Will you set restrictions on wireless telemetry between the  
15 electric vehicle -- I mean the entry vehicle and the safety  
16 vehicle for the purpose of monitoring and anticipating each  
17 situation that might require an E-stop?

18 PANEL: We would ask you to write that in your  
19 technical paper that that is your technical approach for  
20 doing that and let us take a look at it. The question, I  
21 think, was: Are you allowed to send telemetry from the  
22 challenge vehicle to the team for the purpose of evaluating

1 the performance of the challenge vehicle? Is that correct?

2 QUESTIONER: Yes. That is correct.

3 PANEL: Okay. We would like you to request that  
4 in your paper and indicate in the paper how we could be  
5 confident that telemetry wasn't going to be used for any  
6 other purpose.

7 QUESTIONER: Okay. One follow-up. It is on the  
8 issue of recognition of another entry. I was thinking of a  
9 situation where you might have a small ATV-size vehicle that  
10 has been stopped and it might be in the 4 minutes -- no, of  
11 its 10-minute countdown, and you are coming up on the  
12 vehicle and you can't distinguish it from a boulder and you  
13 decide, well, I can go over this obstacle and just run over  
14 it. [Laughter.]

15 PANEL: The judge -- if you come across -- you are  
16 approaching a disabled vehicle. The judge can issue a  
17 mandatory E-stop, which you will not be penalized the time  
18 for. It is a judgment call by the judge whether it is  
19 disabled or thinking. Next question up front.

20 QUESTIONER: I have a second question. This one  
21 has to do with the design of the E-stop. I am wondering if  
22 my design would be sent back to me for this. So, in an



1 emergency, can the vehicle be controlled remotely during an  
2 E-stop, so that people don't have to get out and move the  
3 vehicle while other robots are coming? If you go over the  
4 hill and you can't see the robot, the E-stop happens. So,  
5 even if it means me being disqualified, can I write in my  
6 design that, hey, if I get disqualified, I am going to move  
7 this thing remotely so that I don't put my --

8 PANEL: Yeah, that's fine.

9 QUESTIONER: -- teammates in harm?

10 PANEL: Let us think about that. Once you are  
11 disqualified, you are disqualified. So you can touch the  
12 vehicle. You can do whatever you need to do to move the  
13 vehicle.

14 QUESTIONER: Yes, but if I put that in my design  
15 paper would it be sent back to me as --

16 PANEL: Put it in your design paper, and we will  
17 take a look at it. I don't see a problem at this moment.  
18 Okay? Next question.

19 QUESTIONER: Egor Karen [ph], Texas [inaudible].  
20 I was wondering if there was any type of particular  
21 inclement weather that would essentially stop the race. You  
22 guys around here seem to have earthquakes from what I hear.

1 Since some of our robots may have some type of [inaudible]  
2 sensors, I would like to know when they need to know that it  
3 is natural occurrence or not. So this is why I'm asking my  
4 question.

5 PANEL: I am struggling with your question here.  
6 We are going to run the event, no matter what, okay? If  
7 that is what you are asking, if we are going to delay it  
8 because of an earthquake?

9 QUESTIONER: Well, are you guys thinking about  
10 some type of E-stop during the earthquake so that  
11 essentially [Laughter.]

12 PANEL: Thanks. We will move on. Okay?

13 QUESTIONER: No, I have a second question.

14 PANEL: All right.

15 QUESTIONER: Within the 2 hours that you are  
16 allowing us to have before the race, are we allowed to take  
17 photos of the other competitors' robots or whatever we are  
18 competing with?

19 PANEL: I don't see why not. I mean, we are going  
20 to line them all up. They are going to be on display and  
21 getting ready to start, whether it is a land rush deal or a  
22 sequence. We are going to have the press out there. They

1 are going to be taking photos.

2 QUESTIONER: And should we assume it is 2 hours  
3 before or a bit more?

4 PANEL: Well, I think we will take that under  
5 advisement, but I don't see a problem taking photos. I  
6 really don't. Whether it is 2 hours or 30 seconds prior.  
7 Next question.

8 QUESTIONER: Okay. It was mentioned earlier that  
9 the chase vehicle has to act truly as a chase vehicle; that  
10 is, stay behind the race vehicle. If a vehicle has to  
11 backtrack for whatever reason, what does the chase vehicle  
12 do? If the race vehicle is taking a wrong turn and has to  
13 backtrack, potentially coming back into an area of high  
14 traffic --

15 PANEL: Okay. The question is there is a rule  
16 that says that the safety vehicle cannot lead the challenge  
17 vehicle. There is a little sentence, I think. I hope it  
18 survived and it is in this rule package, that there will be  
19 brief periods -- you know, it is the field judge's judgment.  
20 There will be brief periods in which the safety vehicle can  
21 be ahead, but remember, I said the purpose for that rule is  
22 just to prevent somebody having a solution that has the bot

1 follow the safety vehicle down the whole route.

2 QUESTIONER: This is a follow-on to that. Will  
3 the lateral boundaries be set to preclude the possibility of  
4 having to backtrack in the tight areas, I guess, the narrow  
5 areas?

6 PANEL: Will the lateral boundaries be set to  
7 preclude backtracking?

8 QUESTIONER: Yeah. Preclude the race vehicle  
9 really having a logical possibility of having to backtrack.  
10 That is, if it goes outside a lateral boundary, obviously  
11 it is disqualified. I am wondering if there is going to be  
12 enough lateral boundaries that that thing may start to climb  
13 a berm and decide that it wants to backtrack, which would  
14 cause large problems for everybody else.

15 PANEL: Right. The lateral boundaries are, for  
16 the most part, I believe, going to be set by the land use  
17 authorities. We are not setting them to make the route any  
18 more or less difficult. We would love to have just the  
19 widest open area, but we are going to have lateral  
20 boundaries. Now, if you are precluded from backing up  
21 because it is too narrow, you are going to have to work with  
22 that. You are permitted to back up. Okay? I mean, Dr.

1 Fish knows more about this than me, but I have followed some  
2 of these vehicles around and the safety vehicle, the guy  
3 always has his hand on the reverse because these guys do  
4 back up. Next question, please, in the rear.

5 QUESTIONER: Dion Damato [ph] from Scottsdale,  
6 Arizona. I have two questions. The first one is: What is  
7 the minimum or maximum distance between the waypoints? You  
8 said that they are going to be closer in local areas where  
9 roads are, but what can we expect as far as -- are they a  
10 quarter mile, 50 miles?

11 PANEL: Mike? It is still to be determined, and  
12 it is going to be varying widely. There will be some places  
13 where, because of land use issues, we may have to keep you  
14 on a very narrow, winding course. So we will have the  
15 waypoints very close together. There will be other areas  
16 where you are allowed to go over a very wide stretch. So we  
17 may have a mile in between waypoints. That wouldn't be  
18 completely outrageous, but the exact number is still to be  
19 determined. You are not going to find that out until right  
20 before the event.

21 QUESTIONER: Okay. The second question is: With  
22 the 2 hours before the race, is the course open for

1 competitors to drive on?

2 PANEL: Negative.

3 QUESTIONER: Okay. There was an earlier question  
4 with taking -- flying over the course in that 2 hours.

5 PANEL: Negative.

6 QUESTIONER: You can't fly over the course in 2  
7 hours.

8 PANEL: You can take pictures of the course by  
9 commercial entities, if that is what you plan to do. So, if  
10 that is a commercial entity and everybody has access to the  
11 course at that time, you think you can do it in 2 hours,  
12 that is fine. I think that Mother Nature --

13 QUESTIONER: So you can have a commercial driver  
14 to drive the course for 2 hours?

15 PANEL: Negative. There is no pre-running of the  
16 course. Okay? Next question in the front, please.

17 QUESTIONER: My name is Bob Thorpe. Actually,  
18 that was my comment, too. Somebody earlier had made the  
19 suggestion of like doing a fly-over within those 2 hours.  
20 My suggestion is it is all closed down.

21 PANEL: Okay. Thank you. Next question.

22 QUESTIONER: Yes. My name is David Walker from

1 the University of Texas. I just need clarification. You  
2 mentioned earlier that transponders are not allowed. Are  
3 calibrated, stationary, differential GPS beacons allowed?

4 PANEL: That falls under that rule that I had on  
5 my chart. If that is your technical approach, you need to  
6 put that into your technical paper and let us evaluate it.  
7 Is this a private DGPS that you are talking about?

8 QUESTIONER: Yes, a privately owned DGPS.

9 PANEL: That is not explicitly permitted in the  
10 rule -- [audio break].

11 PANEL: [In progress] -- inputs on that. I mean,  
12 I can't get any more precise than that, but if you want it  
13 less and everybody wants it that way, that is fine. A  
14 question in front, please.

15 QUESTIONER: There is a potential gray area in the  
16 participation of graduate students who are doing closely  
17 related research under Government sponsorship. Is that  
18 considered a conflict? Can it be resolved by them doing it,  
19 quote, "on their own time," or is that a situation to be  
20 avoided entirely?

21 PANEL: If you have somebody that has that  
22 circumstance, you should probably get in touch with us and

1 let us evaluate it and see how closely related and what it  
2 is they are doing and who they are doing it for, just so we  
3 can tell you for certain because everybody's situation is a  
4 little bit different. So I can't tell you for sure that  
5 that is no, you couldn't use grad students in that category,  
6 but let us look at it and see what they are doing. Question  
7 in the back, please.

8 QUESTIONER: This is coming back for seconds. It  
9 is my last one question. Doug Blodgett from Redondo Beach.  
10 Just a follow-up on navigable obstructions and disabled  
11 entrants. It is up to the judge's -- the safety crew's  
12 judgment of whether incidental contact is allowable. Would  
13 that be extended to considering an entrant a navigable  
14 obstacle?

15 PANEL: I would say incidental contact is already  
16 allowed. If you are talking about totally running over and  
17 crushing it, that is probably not going to be --

18 QUESTIONER: No, no. The question is we have an  
19 emergency, been asked to do an emergency stop. Would the  
20 judge be allowed to say, based on the entrant saying, we can  
21 drive over that safely? Would the judge --

22 PANEL: Drive over, no. If you are talking about



1 if the judge issues an E-stop and you slam on the brakes and  
2 maybe you tap the vehicle, are you going to be disqualified,  
3 no. That would be an incidental contact. If you can get  
4 around it and you are just going to lightly tap it, that is  
5 fine. If you are going to drive right over it, there is no  
6 reason to do that. You have got to E-stop. You are not  
7 being penalized. That time is going to be credited to you.  
8 So you just have to wait until we move that thing out of  
9 the way.

10 QUESTIONER: So you don't anticipate the judges  
11 allowing incidental contact while going over a vehicle?

12 PANEL: I wouldn't define "running over a vehicle"  
13 as incidental contact.

14 QUESTIONER: Well, no. It is a very controlled  
15 navigation of an obstacle. [Laughter.]

16 PANEL: Thanks, but I am going to give you the  
17 hook here. Next question, please.

18 QUESTIONER: This question is for Sal. By the  
19 way, I am Ted Hoodako again. What is average speed of  
20 vehicles in SCORE's Annual Barstow to Vegas Race? Could you  
21 give us some sense of how fast they go in that?

22 PANEL: We have not had a Barstow to Vegas event

1 in about 15 years. First, I think I could answer what you  
2 are saying. I have already driven three proposed routes in  
3 an F-150, a Ford pickup truck that is basically stock except  
4 for a little modification to the shock absorbers and using  
5 B.F. Goodrich all-terrain tires. I was able to average  
6 about somewhere between 38 and 40 miles an hour. I did get  
7 stuck in a couple of areas behind some traffic. I would  
8 think that of the three courses, the fastest course that I  
9 was on, a SCORE event or in a trophy truck or a Class One  
10 type vehicle, could probably average somewhere between 55  
11 and 60 miles an hour on the entire 200 and approximately 50  
12 miles.

13 QUESTIONER: Okay. Sort of a follow-on. Since it  
14 sounds like the bots are being asked to perform it 50 or 60  
15 percent of what a human can do, any possibility that the  
16 organizers would consider basing the winner on maximum  
17 distance or number of waypoints covered in 10 hours?

18 PANEL: No. Thanks. I have got clear directions,  
19 you know? That is pretty easy. Next question, please.

20 QUESTIONER: Question regarding the mandatory  
21 20-minute stop at the checkpoint. Is it going to be  
22 adequate just to have that thing pull up to the prescribed

1 stall and E-stop it, or do you have a recommended or  
2 dictated procedure for that?

3           PANEL: We do not yet have any recommended  
4 procedure. It is currently envisioned that when you receive  
5 your file of waypoints that each team will have a unique  
6 waypoint. After entering the checkpoint gate, that will be  
7 a waypoint, there will be a unique waypoint, then, that will  
8 designate the parking area for your challenge vehicle if you  
9 are not using autonomous servicing. Then it is envisioned  
10 that, yes -- certainly, okay, you can imagine there would be  
11 a speed limit coming in there, right? So you will not be  
12 going very fast. You will proceed to the waypoint given for  
13 your challenge vehicle to park for the 20-minute period, and  
14 that is correct. It is envisioned you would execute the  
15 E-stop, and that would be what would bring the vehicle to a  
16 halt and then reestablish the link when the 20 minutes are  
17 up. It would proceed to the departure gate of the  
18 checkpoint area at a slow speed and then go out. Next  
19 question.

20           QUESTIONER: Steve Stewart from Los Angeles. I  
21 have a question that doesn't regard stopped or disabled  
22 vehicles, but slower vehicles.

1           PANEL: Let me just stop you real quick. There  
2 are about seven of you who are going to ask questions. We  
3 have got 5 minutes. I would like to get all seven of you,  
4 but I would like to do this very quickly. Okay? Question,  
5 please.

6           QUESTIONER: Not regarding stopped or disabled  
7 vehicles, but slower vehicles on the course, so not an  
8 E-stop, but say a vehicle is going 30 miles an hour and your  
9 vehicle is going 60 miles an hour on a narrow portion of the  
10 course, are we all penalized, everyone behind that vehicle  
11 is penalized because the lead vehicle is going 30 miles an  
12 hour?

13          PANEL: If you can't pass it because of the  
14 lateral boundary?

15          QUESTIONER: Right.

16          PANEL: If you have got a good idea on how to  
17 write a rule for that, e-mail us because right now, the way  
18 it is, seriously, it is tough. You have got to wait until  
19 you can get around it. I can't think of any other solution,  
20 and I encourage you to e-mail us and let us know if you have  
21 got a solution.

22          QUESTIONER: Staging may be the only way around

1 it, I think, staging a start. And are the winnings taxable?

2 [Laughter.]

3 PANEL: Consult your tax attorney.

4 QUESTIONER: They are Federal funds, though; is  
5 that right?

6 PANEL: Next. Good answer from the General  
7 Counsel. Next question in the back, please.

8 QUESTIONER: My name is John Burge [ph] from Santa  
9 Monica, and my question is: How does the Government intend  
10 to determine that no competitor has used classified  
11 information to modify a domain map? The question is: How  
12 does the Government intend to determine that no one has done  
13 that?

14 PANEL: That is part of the overall inspection  
15 process. There is a lot of ways that people could cheat in  
16 order to --

17 QUESTIONER: Yeah, but you said you wouldn't read  
18 the code.

19 PANEL: Excuse me?

20 QUESTIONER: You said you wouldn't ask for the  
21 software.

22 PANEL: No, but -- I mean, first of all, you

1 couldn't just show up with classified --

2 QUESTIONER: Well, you wouldn't know I had done  
3 it, would you?

4 PANEL: We are going to ask you --[Laughter.]  
5 Okay. We are going to ask you to certify that you have not,  
6 one, broken the rules or, two, used any classified  
7 materials. If you sign that and we find out that you have  
8 -- and there are ways we can find out that you have --  
9 then that will be -- that is a criminal action. So I would  
10 encourage you not to do that because --

11 QUESTIONER: Oh, I wasn't thinking of doing it  
12 myself.

13 PANEL: Oh, I know. [Laughter.] All right. Next  
14 question up front, please. I have got to move along.

15 QUESTIONER: You are giving us a thousand  
16 waypoints. That is a lot of data enter in 2 hours and a lot  
17 of room for error. I am hoping that it is going to be  
18 provided in some sort of electronic form and that we would  
19 get a sample file ahead of time, so we could make sure that  
20 we are able to read this thing.

21 PANEL: Yes and yes. Next question in the rear.

22 QUESTIONER: Anthony Levindowski from UC-Berkeley.

1 Sorry for asking another question, but it seems clear to me  
2 that you will not allow a pre-run of the course.

3 PANEL: Correct.

4 QUESTIONER: Could you please clarify whether or  
5 not you can, within a 2-hour time frame that we have of the  
6 waypoints, survey aerially the region?

7 PANEL: Okay. I will get back to you by April 1st  
8 on that. Let me go back because there is a lot of  
9 discussion on that. I want to make sure we get this one  
10 right. So let me table that one, and I will take that on.  
11 Next question.

12 QUESTIONER: To be on the safe side, I want to  
13 find out whether one of the vehicles we are playing with is  
14 a dual-purpose one; in other words, can be driven by a  
15 person or by a computer, either/or.

16 PANEL: Okay.

17 QUESTIONER: And it is standard military vehicle  
18 --

19 PANEL: Right.

20 QUESTIONER: -- would that be okay?

21 PANEL: Yes. Are you talking about tele-operated  
22 by a human or sitting in the vehicle?

1 QUESTIONER: No, no. Sitting in the vehicle.

2 PANEL: That is fine as long as there is no human  
3 sitting on it during the event. I have got to move on. I  
4 have got three more. I have got to go. Thank you very  
5 much. Catch me after the break. We are going to get a  
6 break here, and you can ask it then. Next question in the  
7 rear.

8 QUESTIONER: This is with the waypoints. It just  
9 occurred to me that someone is going to be defining the  
10 course using a particular receiver or survey method. What  
11 if they make a mistake and say you have to go to this  
12 latitude/longitude and that turns out to be in the middle of  
13 a cliff or a lake or somewhere they didn't actually intend  
14 to go?

15 PANEL: I won't be standing here next time. Okay?  
16 We are not going to make that mistake, but it can happen  
17 and I understand that.

18 QUESTIONER: In related areas, the errors  
19 associated with a receiver, you might in all good intent say  
20 I won't go here and this is the data for this point based on  
21 my receiver and all the competitors say I am at the same  
22 data point according to my receiver and it is geographically



1 different.

2           PANEL: Right. We are totally aware of that. We  
3 are very attuned to the fact that the data that we have to  
4 give you has to be absolutely accurate, and the previous  
5 question about if you are going to get a test file that you  
6 can run to make sure it runs, we are going to make sure this  
7 is very, very accurate. You are very correct that there is  
8 going to be an error circle, and I mentioned earlier that  
9 remaining within the area of the error circle will not  
10 necessarily keep you within the lateral boundaries of the  
11 course. If there are some very critical waypoints that we  
12 have to present to you, we are going to take extraordinary  
13 measures to make sure that the error circle of those  
14 waypoints that we give you are just as good as we can get  
15 them. Okay, last two questions.

16           QUESTIONER: Will [inaudible], Ventura County. Is  
17 there a way to prevent everyone's e-mail address from being  
18 exposed indiscriminately on your web page?

19           PANEL: I think you signed a statement that you  
20 released that e-mail information. I can do it by exception.

21           QUESTIONER: Okay. Question. Why not elevation  
22 along with latitude and longitude for a waypoint?

1           PANEL: We hadn't planned to give that  
2 information. There is no plan for it. If your technical  
3 solution -- actually, we have had a lot of requests for  
4 additional information, specialized terrain data, this,  
5 that, and the other thing, and we have actually told the  
6 other folks who corresponded with us that what we showed up  
7 with here is pretty much what we intend to give: the  
8 latitude, the longitude, the lateral distance, the speed, et  
9 cetera. If there is a reason that you need -- I don't know.  
10 We are just going to have to think about the elevation  
11 data. We just hadn't planned on giving that out. We are  
12 not collecting it. Can I get the last person, please?

13           QUESTIONER: Bob Thorpe. I don't want to be a wet  
14 blanket, but I would like to suggest a speed limit, the idea  
15 being that --

16           PANEL: Bob, trust me, you don't want a speed  
17 limit.

18           QUESTIONER: If there is an 80-mile-an-hour Humvee  
19 coming up on my tail and I am in my safety vehicle, I would  
20 hate to be the test dummy that finds out that their  
21 collision avoidance system does not work. Long story short,  
22 I mean, it would be great to win the million dollars, but I

1 would also like not to lose my life during this race because  
2 somebody else's vehicle --

3           PANEL: Let us have the survey team investigate  
4 that and see that -- you know, there is all kinds of terrain  
5 that they are looking at, and there are all kinds of  
6 possible speeds that can be attained on that terrain. So  
7 why don't we just investigate that. Safety, as we all say,  
8 is the number-one concern here. That is a valid point. So  
9 let us look at that and see if a speed limit of some sort  
10 would not harm the challenge, but would enhance safety.

11           QUESTIONER: I guess probably a follow-up to that  
12 would be that a vehicle -- I don't know how exactly you  
13 would do this, but a vehicle would be rated. In other  
14 words, your team would look at a vehicle and basically say  
15 based upon the safety equipment on board, based upon the  
16 stability of the vehicle, it can go up to a certain speed  
17 and still reliably keep everybody else that is on the race  
18 course safe. So it is just a thought.

19           PANEL: Okay. We will take a look at that.

20           QUESTIONER: Listen, we have come to the  
21 conclusion of our Q&A, and I would like to thank the  
22 panelists and really the team members here. [Applause.] I

1 probably owe several of you several drinks. So please join  
2 me upstairs later on this afternoon, but at this time, what  
3 I would like to do is we have got a press conference  
4 upstairs at 1300. So I would like for the panelists to walk  
5 down the middle of the aisle and head that way.

6 I would like for the folks here, remain here. I  
7 am going to turn the program over to Rob McHenry. He is  
8 going to talk to you about this afternoon and what your  
9 expectations can be for this afternoon.

10 So, Rob, you have got it.

11 [Applause.]

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